

WHAT IS CLAIMED IS:

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1. A detector of electromagnetic radiation comprising:
a semiconductor substrate with dopants of a first conductivity type at a first concentration density, and with an insulating layer at its surface;
a collection region with dopants of a second conductivity type which is opposite the first conductivity type at a second concentration density, formed in the surface region of the semiconductor substrate;
10 a dual-purpose electrode formed on the insulating layer, extending over both the surface of at least part of the collection region and over at least part of the substrate.
2. The detector as recited in claim 1 wherein the substrate further comprises a barrier region of the first conductivity type with a concentration density of dopants being higher than the concentration density of dopants in the substrate.
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3. The detector as recited in claim 2 wherein said barrier region is extending at least partly under the dual purpose electrode.
4. The detector as recited in claim 1 further comprising a detection region with dopants of the second conductivity type at a third concentration density, formed in the surface region of the semiconductor substrate and not bordering the collection region and being connected to read-out electronics.
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5. The detector described in Claim 1, wherein the collection region forms a junction with the semiconductor substrate.
6. The detector described in Claim 5, wherein the junction formed is a photodiode.
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7. The detector described in Claim 1, wherein the surface regions of the semiconductor substrate beyond the collection region are barrier regions which have dopants of the first conductivity type at a concentration density larger than the concentration density of the semiconductor substrate and the read-out electronics are formed within the shielding regions.
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8. The detector described in Claim 7, wherein at least part of the charge carriers that are generated in the semiconductor substrate underneath the shielding regions are collected by the collection region.

9. The detector described in Claim 1, wherein a pinning region with dopants of the first conductivity type at a fourth concentration density is within the surface region.

10. The detector described in Claim 9, wherein the pinning region is not covered by the dual purpose electrode.

11. The detector described in Claim 10, wherein the pinning region is aligned with the dual-purpose electrode, and extends along the collection region.

12. A method of making a detector of electromagnetic radiation comprising:
providing a semiconductor substrate with dopants of a first conductivity type at a first concentration density, and with an insulating layer at its surface;

forming a collection region by introducing dopants of a second conductivity type which is opposite the first conductivity type at a second concentration density region into the surface region of the semiconductor substrate; and

forming a dual-purpose electrode on the insulating layer with the dual-purpose electrode extending over the surface of the collection region.

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